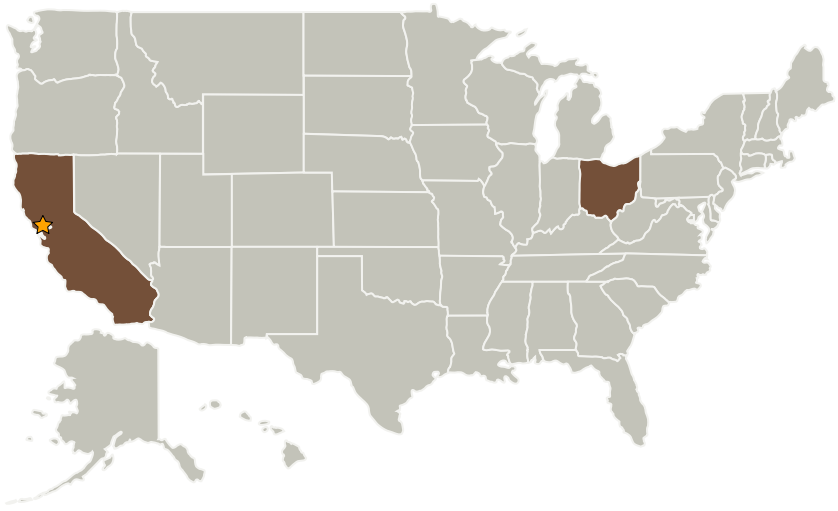
Intercalated and Hydrogenated Carbon Nanofibers for Multifunctional Radiation Protection, Phase I

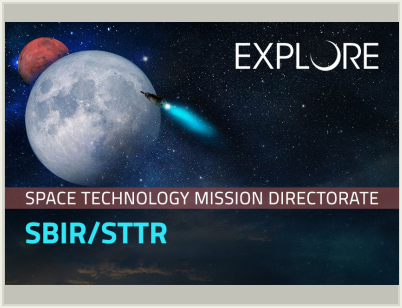
Completed Technology Project (2005 - 2005)

Project Introduction

Improvements in radiation shielding materials are needed to support NASA's human and robotic exploration programs. Shielding for both electromagnetic radiation (gamma and x-rays) and particles (protons and neutrons) are critical. Ideally, the shielding should be part of a multifunctional, structural composite material to maximize mission payload. To meet this need, ASI will develop structural composites enhanced by novel carbon nanofiber (CNF) materials. One version is CNF whose hollow cores are filled with heavy elements for electromagnetic by a novel intercalation technique. Another is hydrogenated CNF for particle shielding. The enhanced CNF will then be included in the resin of a standard carbon fiber reinforced structural composites where they will add radiation blocking functionality and enhance strength properties. In addition, the intercalated nanofibers will be compounded into polyethylene, a known proton absorber, to create a shielding material that simultaneously blocks all relevant forms of radiation. Materials will be tested for gamma, x-ray, and proton shielding, as well as multifunctional structural and electrical properties.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Applied Sciences Inc	Supporting Organization	Industry	Cedarville, Ohio

Primary U.S. Work Locations	
California	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Michael Matuszewski

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.6 Other Advanced Concepts for Generating/Converting Power